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PATENT

**FACSIMILE TRANSMITTAL LETTER**

| Attorney Docket No. | Serial No. |
|---------------------|------------|
| 53924US010          | 09/871,223 |

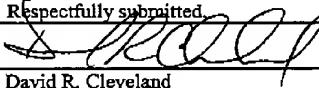
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TOTAL NO. OF PAGES: 15  
 Sent to Facsimile No.: 703-872-9306  
 Examiner Phone No.: 703-308-0716

|   |  |           |                |
|---|--|-----------|----------------|
| In re Application of:   | Desmond T. Curran and Elfed I. Williams  |           |                |
| Serial No.:   | 09/871,223   | Examiner: | Aaron J. Lewis |
| Confirmation No.:   | 6855   | Art Unit: | 3761           |
| Filed:  | May 31, 2001   |           |                |
| For:  | MANNER OF ATTACHING COMPONENT ELEMENTS TO FILTRATION MATERIAL SUCH AS MAY BE UTILIZED IN RESPIRATORY MASKS |           |                |
| In accordance with a telephonic discussion held today with Examiner Lewis, we enclose with this Facsimile Transmittal letter copies of the following documents originally filed on November 17, 2003 and not apparently yet entered into the prosecution file, together with a copy of the November 17, 2003 USPTO autoreply message received by our office when these documents were first filed:<br>This Facsimile Transmittal Letter [1 page]<br>November 17, 2003 Facsimile Transmittal Letter [1 page]<br>Declaration Under 37 CFR §1.131 of Desmond T. Curran [5 pages] and Attachment A [7 pages]<br>November 17, 2003 USPTO autoreply message showing receipt of 35 fax pages on November 17, 2003 [1 page] |  |           |                |
| cc: 703-746-3384  |  |           |                |

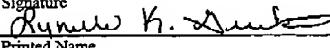
Please charge Deposit Account 50-0549 for any fees under 37 CFR §1.16 and §1.17 that may be required during the pendency of this application. This authorization includes the fee for any extension of time under 37 CFR §1.136(a) that may be necessary. To the extent any such extension should become necessary it is hereby requested.

Respectfully submitted,

|                            |                             |   |
|----------------------------|-----------------------------|---|
| Registration No.<br>29,524 | Direct Dial<br>612-331-7412 |  |
| Date: November 11, 2004    |                             | David R. Cleveland  |

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TOTAL NO. OF PAGES: 35  
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|                       |  |           |                |
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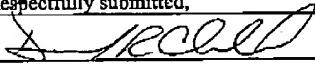
We are transmitting the following documents:

Facsimile Transmittal Letter [1 page]  
 Fee Transmittal for FY 2004 [1 page]  
 Petition for Extension of Time [1 page]  
 Amendment [16 pages]

Declaration Under 37 CFR §1.131 of Desmond T. Curran [5 pages] and Attachment A [7 pages]  
 Declaration Under 37 CFR §1.132 of Lowell E. Christensen [4 pages]

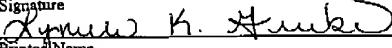
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| To Facsimile Number<br>703-872-9302 | Signature<br> |
| Date:<br>November 17, 2003          | Printed Name<br>Lynelle K. Grube   |

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**3M Record of Invention (EQMS Cover Page)****RESTRICTED**

|  |   |   |   |
|--|---|---|---|
| R.I. No.   | DE1493  | P021539   | Page 1 of 7   |
| Originating 3M Unit<br>Engineering, Quality and Manufacturing Services   | Patent Liaison<br>Stephanie A. Fox, 570-1W-03   |   |   |
| Title<br><u>Continuous Motion Valve Attachment Mechanism</u>   |   |   |   |
| Investigator (full first name, middle initial, last name)<br><b>Lee E. Hitzeman</b>  | Investigator (full first name, middle initial, last name)   |   |   |
| 3M Emp. No. 032111<br>Location 98-2-01<br>Phone Number 778-5737<br>Tech. Notebook No.<br>Department Name Automation Technologies<br>Dept. & section No. 6601<br>Manager's Name <b>Dean A. Shafer</b>                 | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name |
| Investigator (full first name, middle initial, last name)<br><b>Marvin H. Simons</b>   | Investigator (full first name, middle initial, last name)   |   |   |
| 3M Emp. No. 219435<br>Location 99-1<br>Phone Number 778-5439<br>Tech. Notebook No.<br>Department Name STP Fabrication Services<br>Dept. & section No. 0084-50<br>Manager's Name <b>Blaine Haefner</b>                | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name |
| Investigator (full first name, middle initial, last name)<br><b>Des T. Curran</b>  | Investigator (full first name, middle initial, last name)   |   |   |
| 3M Emp. No. UK023315<br>Location Aycliffe<br>Phone Number *8 208-2213<br>Tech. Notebook No.<br>Department Name Resident Engineering<br>Dept. & section No. 2297<br>Manager's Name <b>Alan Kellett</b>                | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name |
| Investigator (full first name, middle initial, last name)<br><b>Wil Williams</b>   | Investigator (full first name, middle initial, last name)   |   |   |
| 3M Emp. No. UK015049<br>Location Gorseionon<br>Phone Number *8 250-2262<br>Tech. Notebook No.<br>Department Name Process Technology Development<br>Dept. & section No. 2729<br>Manager's Name <b>George T. Bates</b> | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name | 3M Emp. No.<br>Location<br>Phone Number<br>Tech. Notebook No.<br>Department Name<br>Dept. & section No.<br>Manager's Name |

Instructions: Within EQMS, this cover page should be completed and the information on the investigators can be left blank on the corporate form. This additional information is needed to facilitate processing of the Record of Invention. Investigators should be considered to be those individuals who contributed significantly to the technical content of the subject of this Record of Invention. The attorney will determine inventorship at the time of filing a patent application.

If possible, critical formal drawings should be reduced to 8 1/2 x 11 and included as a page of the Record of Invention. If larger drawings are needed to understand the invention, two sets should be sent with the Record of Invention forms.

Remember timeliness is a factor. Foreign patent applications must be filed prior to the first disclosure of your idea outside 3M. U.S. patent applications must be filed within one year of this disclosure. In the case of a process or process equipment, disclosure includes the first sale of product made using the process or equipment. It frequently takes several months to prepare and submit a patent application. Therefore, it is essential that you submit your RI as soon as possible.

**3M Record of Invention****RESTRICTED**R.I. No. DE 1493Page 2 of 7Originating 3M Unit  
Automation Technologies/DESPatent Liaison  
Stephanie Fox, 570-1W-03

Title

**Continuous Motion Valve Attachment Mechanism**

|  |   |
|--|---|
| Investigator (full first name, middle initial, last name)<br><br>Lee E. Hitzeman<br>3M Emp. No. 032111<br>Tech. Nbk. No.<br>Div. or Lab Name Automation Technologies/DES | Investigator (full first name, middle initial, last name)<br><br>Des T. Curran<br>3M Emp. No. UK023315<br>Tech. Nbk. No.<br>Div. or Lab Name Resident Engineering           |
| Investigator (full first name, middle initial, last name)<br><br>Marvin H. Simcox<br>3M Emp. No. 219435<br>Tech. Nbk. No.<br>Div. or Lab Name STP Fabrication Services   | Investigator (full first name, middle initial, last name)<br><br>Will Williams<br>3M Emp. No. UK015049<br>Tech. Nbk. No.<br>Div. or Lab Name Process Technology Development |
| Investigator (full first name, middle initial, last name)  | Investigator (full first name, middle initial, last name)   |
| 3M Emp. No.<br>Tech. Nbk. No.<br>Div. or Lab Name  | 3M Emp. No.<br>Tech. Nbk. No.<br>Div. or Lab Name   |

Information relating to this invention was first written down on or about (provide date):

Other potentially interested 3M units:

Was patent/literature search completed?  Yes  No If so, by whom?  
Who has search results?

Person from whom samples/photos/drawings can be obtained:

This invention may relate to government funded research.  Yes  NoThis invention may relate to an outside agreement.  Yes  No

*Includes: (1) Short description of the invention. Avoid use of code names, jargon, acronyms, etc. unless defined. (2) Describe utility of invention, and difference(s) and advantage(s) over previous approaches. (3) Provide one or more detailed examples which illustrate the invention. (4) List any other related information such as publications, internal reports, memoranda, formal drawings, R.I.'s. DO NOT attach copies — incorporate any needed sketches or informal drawings in the text of R.I. (5) Identify any other people who were consulted or otherwise involved in this invention.*

1) This invention is a high speed Continuous Motion Device that forms a mechanical feature that attaches an exhalation valve to the filter material of a new respirator. It is positioned in-line with a continuous motion respirator assembly process and operates at rates in excess of 200 PPM. The attachment forming takes place after a preassembled valve has been placed in position on the respirator filter material.

The process starts with molding a thin wall tube into the base of the valve body. This tube provides the material for attachment. The tube extends through a hole in the respirator filter material as an assembled valve is positioned for attachment. Continuous Motion tooling flares the end of the tube and forces the flare down to the base forming and coining a flat clamping ring at the bottom. The clamping ring attaches the valve to the filter material and seals off the assembly hole.

The filter material is clamped with the valve body on one side of the filter material and the formed clamping ring on the other. The formed attachment holds the valve on the respirator and prevents leakage through the seal of the assembly hole without the use of separate fasteners, adhesives or sealers.

Described by:

Print or type name Lee E. Hitzeman  
Sign and date Lee Hitzeman

This document has been read and understood by me. Witnessed:

Print or type name Brucel J. Livermore  
Sign and date Brucel J. Livermore

Form 3575d

**3M Record of Invention (Continuation Page)****RESTRICTED**

|          |         |
|----------|---------|
| R.I. No. | DE 1493 |
|----------|---------|

|      |        |
|------|--------|
| Page | 3 of 7 |
|------|--------|

Title  
Continuous Motion Valve Attachment Mechanism

2) This high speed mechanical attachment process and device can be used to attach components of assembly to other components or webs. The device described in this record of invention is for a high speed continuous motion process. This forming process is compatible with intermittent motion assembly as well.

3) A need was identified during the development of a new generation of respirators for a high speed process to attach and seal the exhalation valve to the filter material. A special attachment feature was developed by 3M UK and added to the molded valve body. After insertion through the filter material, the feature provides valve material on the backside that can be formed to clamp and seal the valve assembly to the respirator filter material.

The invention of the high speed CONTINUOUS MOTION VALVE ATTACHMENT MECHANISM reshapes the molded feature to clamp and seal the valve to the filter material in a continuously moving web. It is a cold forming process registered to a valve assembly hole through the web. The web is moving at a rate equivalent to 250 PPM.

The high speed CONTINUOUS MOTION VALVE ATTACHMENT MECHANISM is made up of a valve fixture/anvil on a carrier below the filter material web and the forming mechanism on the top. The anvil carriers are attached to an in-line continuous motion conveyor synchronized with the assembly hole through the web. The forming tool developed by 3M U.K. is attached to a rotary continuous motion system that provides tooling perpendicularity during the attachment feature reshaping and clamp forming portion of the cycle. During the forming cycle, the anvil on the carrier is compliant with the forming tooling to maintain proper alignment.

The following sequence of events take place during the High Speed Continuous Motion forming cycle.

**NOTE:**

Assume that a preassembled valve has been loaded onto the anvil carrier. The valve assembly holes have been cut into the filter material web and the anvil carriers are synchronized with the assembly holes in the web. The entire system is running at a continuous motion rate of 250 CPM. Also assume that the filter web is moving from left to right with the forming tooling system rotating in a counter clockwise direction during the following sequence of events.

The forming sequence begins with the form tooling system contacting the anvil carrier compliancy tab. This controls the registration of the upper and lower systems during the rest of the forming cycle. At this point, the forming tooling system is approximately 47 degrees before bottom centerline ( 6:00 position ). See sketch #1

As the form tooling system continues to rotate toward the bottom centerline position, it follows the arc of rotation and moves down in the vertical direction. The spring loaded flare tooling (Nosepiece) engages the inside of the attachment tube on the valve assembly and begins the tube flaring process. This process continues until the nosepiece contacts the fixture anvil which stops its vertical motion. The fixture anvil now controls the NOSEPIECE in this vertical position throughout the rest of the forming operation.

After the nosepiece contacts the fixture anvil (See sketch #2), the form tooling system outer housing continues to move down vertically which rolls the flared material over. Finally, the bottom face of the form tooling system outer housing forms the flat clamping ring feature that attaches the valve to the filter material. The form tooling system is now at the bottom centerline position and the attachment process is complete. See sketch #4.

The form tooling system continues to rotate until it is in a position approximately 47 degrees after bottom centerline. During this rotation, the process steps reverse to the point where the form tooling system loses contact with the anvil carrier compliancy tab. The tooling returns back to the starting position and the next fixture/anvil carrier presents a valve for the attachment process to repeat the cycle. See sketch #3.

A prototype has been built to verify this concept. A video tape and sample parts are available to show the hardware in operation and results of the process. Future plans are to use this invention on the new Genesis product being developed in the UK.



## Auto-Reply Facsimile Transmission

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| Attn: Attorney/Examiner No. Serial No.  |  | 53924US3010 09/871,773  |      |
| TOTAL NO. OF PAGES: 14<br>Sent to Facsimile No.: 703-222-2702<br>Receiving Office No.: 703-222-2715   |  |   |      |
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| In re Application of: Desmond T. Curran and Alfred J. Williams  |  | Patent No.: 5,683,761   |      |
| Serial No.: 09/871,773  |  | Attorney/Examiner: Asstn. J. Lewis  |      |
| Confirmation No.: 6835  |  | Art Unit: 3761  |      |
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| Registration No.: 19,324  |  | Date Filed: 012-331-7412  |      |
| Date: November 17, 2003   |  | Signature: <i>[Signature]</i>   |      |
| REPRESENTED BY: David E. Cleveland  |  |   |      |
| CERTIFICATE OF PATENT AND TRADEMARK   |  |   |      |
| I certify that this communication is being sent to the telephone number shown below, addressed to:<br>Mr. Joseph C. Cleveland, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the above indicated date.<br>The telephone number is 703-222-0902<br>Date: November 17, 2003<br>Signed by: <i>[Signature]</i><br>Printed name: Lynette K. Gruber                              |  |   |      |
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| PAGE 15/15 * RCVD AT 11/17/2003 17:21 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-1/2 * DNI:8729306 * CSID:612 331 7401 * DURATION (mm:ss):04:52   |  |   |      |